Defining a Cultural Context to Underutilized Crops in the Minnesota Food System

Shannon Anderson, University of Minnesota

Abstract

Culture is a universal component and tool in many contexts that has yet to be adequately defined within a food system. As communities are subject to globalization of the food system(s), not only is the biodiversity of organisms being affected but cultural diversity as well.[1] In order to fully develop and identify barriers and challenges in food systems, culture as operationalized within a system needs to be understood and represented as a part of the entire framework.[2] This journal describes independent research conducted remotely within the context of the Barley food system and studies conducted on aspects of the rural food system in an attempt to define tools that can be used for cultural analysis in rural food systems.

Introduction

The global community is currently faced with various challenges such as rising demands for food production, food insecurity, obesity, disparities in farming communities and accompanying income challenges, diet-related diseases, pollution, greenhouse gas emission, and loss of biodiversity.[3,4] Global and local food systems contribute directly and indirectly to all of these issues. The concurrent issues in the food system are commonly referred to as the diet, health and environment trilemma.[4] Professionals in food, health, and agriculture are tasked with finding a socioeconomically equitable solution as the trilemma grows.

Several studies have suggested biodiversity as a viable strategy to impact the diet, health, and environment trilemma.[5,6] Finding nutritionally resilient and diverse crops will assist in improving landscape diversity and health outcomes. Systems-based processes are expressed as the sustainable, nutritional intensification of agriculture. Supply chains that support the

development and delivery of nutritionally resilient food products are referred to as nutrition sensitive value chains (NSVCs) and are essential in this process.[7]

As the 5th largest agricultural state in the nation, agriculture is a critical component of the Minnesota economy.[8] Minnesota also produces several underutilized crops such as oats, barley, sunflower, canola, peas, and snap beans. Increasing use and consumption of these crops may allow improvements in community health and biodiversity. Previous work has examined the Minnesota small grain supply chains, but has not considered culture as a factor.[9] For example, barley may be a viable candidate to contribute to the increased demand on the food system, and to improve health outcomes.

Barley is rich in fiber and bioactive components such as phenolics and phytatesith and has consumption linkages with reduced risk of type two diabetes, coronary heart disease, certain cancers, and improved weight maintenance.[10] Despite the many benefits barley offers, production and consumption are minimal, mainly due to systemic challenges throughout the supply chain. Additionally, with a diverse use of barley throughout the globe and over 130 years of cultivation in Minnesota, it offers a culturally rich context to view and gain insight into barriers and opportunities in the food system and the cultural contexts within.[11]

The following study explores the preliminary research and coding completed to establish a method for analyzing the underlying cultural systems and the challenges that may aid the recovery of underutilized crops such as barley in the Minnesota food system. The tools of this system aim to eventually integrate and connect the various sectors of the food system to allow for a more operational consumer focused approach that would meet the needs of each sector within. In the context of this study, culture is defined as the practices that people create to give themselves continuity across generations.[12] Therefore, the questions were formulated by

considering what experiences, practices, and beliefs each sector holds in relation to the product analyzed.

Methods

This study utilized Systems Mapping Assessments, assessing linkages between key stakeholders, processes, and functions throughout the food System. This tool visually displays how processes fit together to produce an outcome. SMAs are also used to identify key challenges, barriers, opportunities, and unintended consequences of systems.

Preferences and cultural characteristics were collected through deductive coding of multiple studies and journals that had covered specific cultural areas that were identified in the initial SMA created for this study. Deductive coding or codes that arise from research questions or via literature analysis, were the main approach used in this study.[13]

The use of a semi-structured interview approach was utilized in New Ulm for this study to grade the effectiveness of the FSCAT in the lens of the underutilized grain, barley. Inductive coding, the process through which codes arise through interaction from a direct source, was used to evaluate the given interview.[13] More interviews were anticipated, as will be further explained in the limitations section of this journal.

Both forms of coding contributed to the development of the SMA. The SMA was then analyzed and simplified to develop the FSCAT model to assist in further barley specific and food systems research.

Results

Figure 1 displays the Food System Cultural Analysis Tool that was conceptualized during this study to reflect and relay the data collected from inductive and deductive coding. **Figure 2** displays the resulting map of the data collected relative to the barley specific food system. **Figure 3** displays the basic questionnaire tool developed for this study to analyze participants and the significant data collected. While **Figure 4** displays the systems map of the cultural context of barley in the food system.

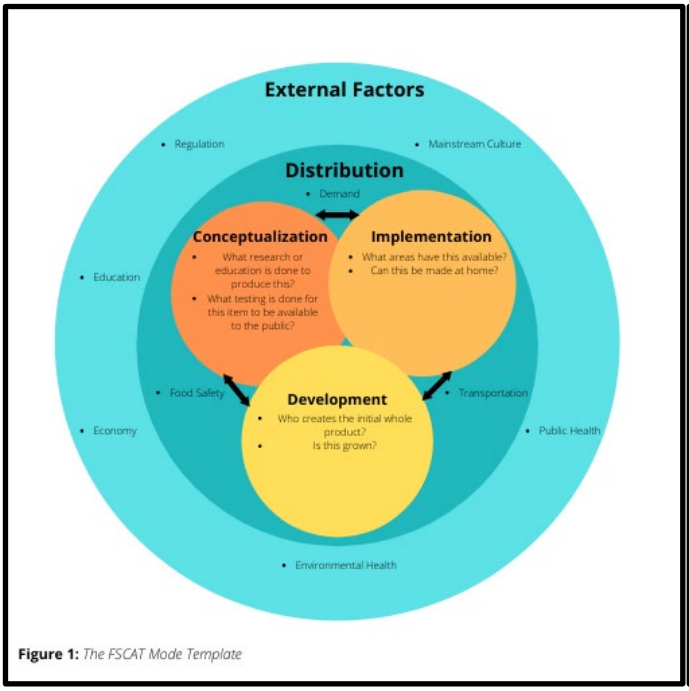

Figure 1: *The FSCAT Mode Template*

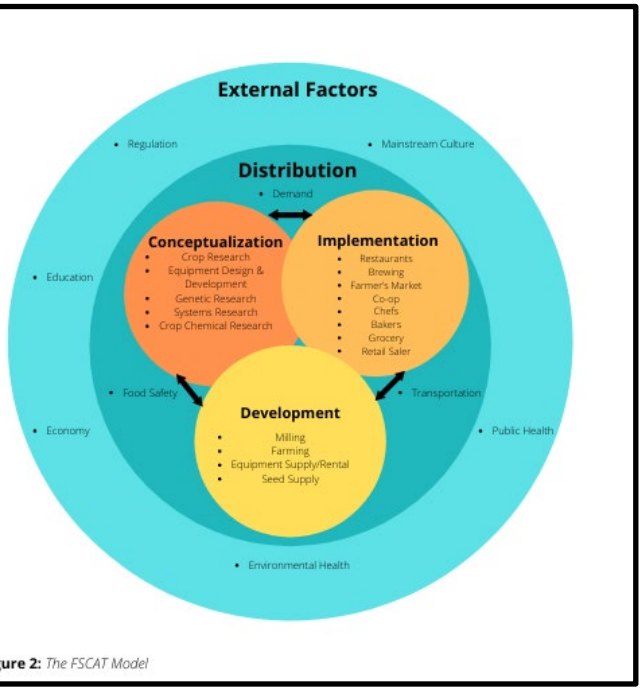

Figure 2: *The FSCAT Model*

Barley Specific FSCAT Questionnaire

1. How would you describe the culture or characteristics of those normally in your job position?
   a. What specific skills, hobbies, lifestyles do you value in each employee?
   b. What would you consider to be your greatest priority in your position?
2. If you could name your customers top priorities what would they be?
   a. What about the sellers that you interact with?
3. Are you familiar with barley?
   a. Have you had any business with this grain previously?
   b. How do you include this grain?
   c. Are there any barriers that you are aware of for getting barley?
4. What types of foods would you like to see barley included in?
5. What are some of your favorite foods/drinks outside of barley?
6. Would you yourself or do you have any other connections or individuals whom you think would be interested in working with our future team?

Broad FSCAT Questionnaire

1. How would you describe the culture or characteristics of those normally in your job position?
   a. What specific skills, hobbies, lifestyles do you value in each employee?
   b. What would you consider to be your greatest priority in your position?
2. If you could name your customers top priorities what would they be?
   a. What about the sellers that you interact with?
3. Are you familiar with this product?
   a. Have you had any business with this product previously?
   b. How do you include this product in your work?
   c. Are there any barriers that you are aware of for getting this product?
4. What types of foods would you like to see this product included in?
5. What are some of your favorite uses of this product?

Figure 3: The complimentary FSCAT Questionnaire

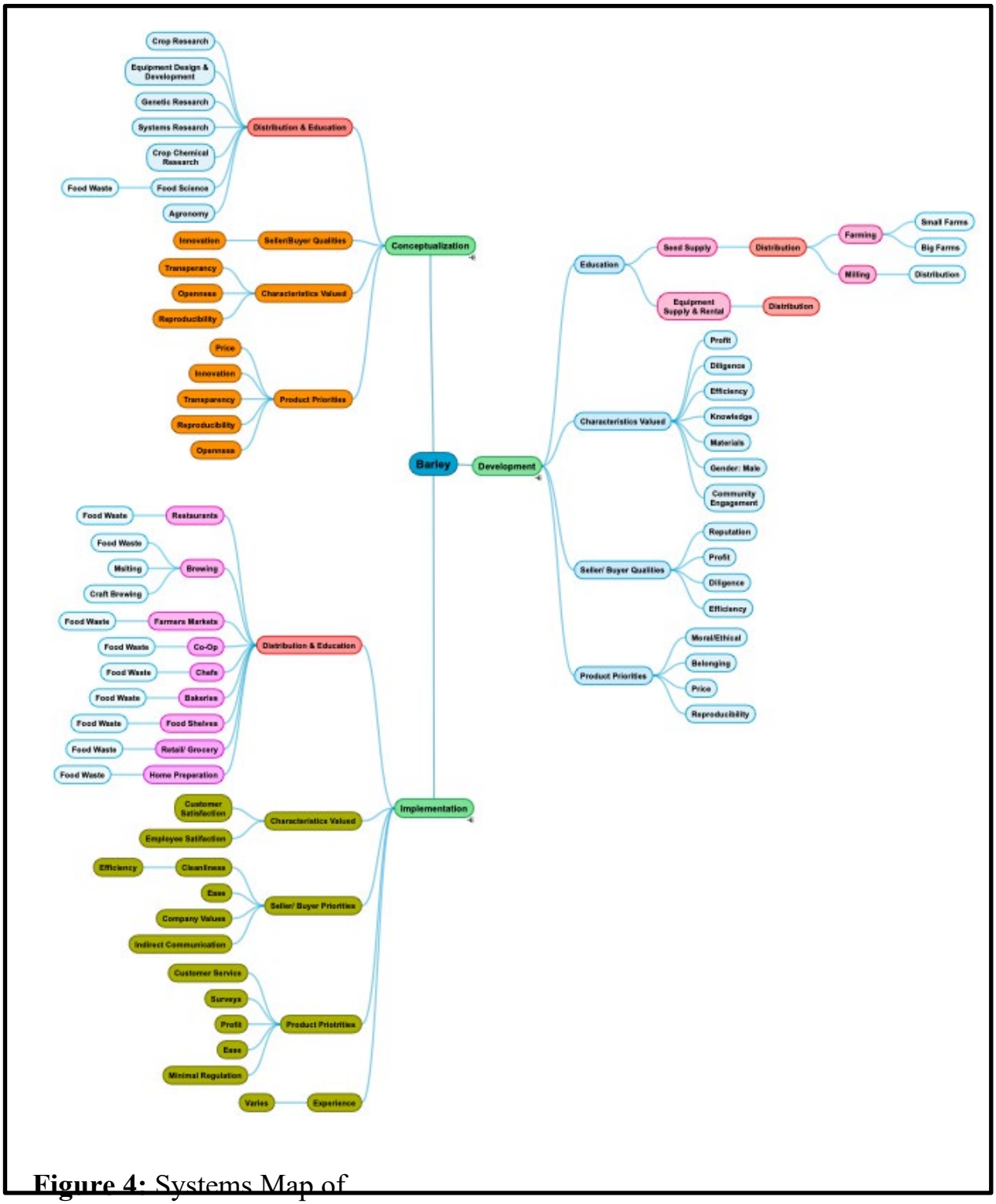

Figure 4: Systems Map of Barley Culture

The information collected contributed to developing the Food System Cultural Analysis Tool, which is intended to guide future research in integrative, sustainable food systems. The FSCAT was inspired by Bronfenbrenner's ecological model in that each category has a multidirectional relationship with the structures contained within.[13]

The determined cultural categories were external factors, distribution, conceptualization, implementation, and creation. External factors are considered to be regulation, mainstream culture, economy, education, public health, and environmental health representing the area in which the system is located. The factors of distribution are determined to be the transportation, food safety, and demand of the given products of concern. At the center of the model, there are three separate categories; conceptualization, creation, implementation. For the purpose of this study, conceptualization entailed crop research, equipment design and development, genetic research, systems research, and crop chemical research. Creation entailed milling, farming, and feed supply. Implementation entailed restaurants, co-ops, bakeries, chefs, butchers, and brewing. These factors would vary with each product being analyzed yet the categories would stay the same. To determine factors in each area, the use of an SMA was used. The grouping defined by the SMA showed clear barriers of cultural methods and communication, therefore in the FSCAT model the circled areas were put in place to highlight areas that have cultural barriers in place, unique domains of knowledge, and areas in need of communication.

Limitations and Future Research

Many experts were reached out to during the course of this study including manufacturers, product developers, chefs, and consumers. Due to the restrictions in place due to the COVID-19 virus, only indirect communication was available for this study. Several of these experts were not able to be contacted which hindered the possibility for this study to analyze the

New Ulm food system specifically, as was the initial goal. It is possible that in person interactions may change both the nature and the results of this study.

During the exploration of studies regarding the culture in each area of the food system, it became apparent that there was a lack of up to date information regarding the culture and preferences in each area, which makes this study difficult to focus in a particular area and to predict realistic and applicable results as these characteristics shift over time with the mainstream culture. However, many of these facts are well known throughout the United States and have been shown through stereotypes that have arisen over the years. The main concern remains to consider the aspects that may be present outside of the stereotypical patterns or that which is considered the norm in order to truly understand the relative rate of success at which a food item would be accepted and supported in each area within a specific food system.

As this study was conducted by a single undergraduate student, many professionals were reached without having any prior knowledge or relation to this project. This may have significantly reduced the ability to acquire interviews during this time.

Additionally, this study made an attempt to develop new tools to analyze specific products in the food system through a communicative and cultural lens. However, with this being a new tool developed during this study, the validity and reliability of this tool has not been pilot tested. Further replication within a specific food system is necessary to justify use. The given tool was developed by combining data from the systems mapping approach and the multidirectional nature of Bronfenbrenner's ecological model, which are both regarded as reliable tools in many research fields.

Conclusion

This study provides a unique analysis of the food system by pulling together many different fields as they are inherently connected within food systems. The tools developed in this study may allow future research to target a whole system approach in a way that can also be easily communicated to the public. Further analyses will be necessary, to more accurately depict the food system of emerging, underutilized crops and the underlying cultural map, via a series of intensive individual interviews, via phone, virtual teleconference, or in-person when appropriate, with key stakeholders and experts throughout the food system. Future research may be more successful by returning to an area of previous research to increase the likelihood of more open and honest data to accurately depict how a food item can enter or re-enter the competitive food system.

The tool is intended to need further refinement to tailor the research experience to the specific food product. This process has set an initial basis to identify key challenges, barriers, and opportunities throughout the supply chains of emerging and underutilized crops and will be useful to future food systems researchers.

This project was supported by the University of Minnesota's Office of Undergraduate Research.

Resources

1. Kennedy, G., Nantel, G., Shetty, P.(2004)Globalization of food systems in developing countries: impact on food security and nutrition.
2. Global Panel on Agriculture and Food Systems for Nutrition. 2020. Future Food Systems: For people, our planet, and prosperity. London, UK.
3. Tilman D, Balzer C, Hill J, Befort BL. Global food demand and the sustainable intensification of agriculture. Proceedings of the National Academy of Sciences. 2011;108(50):20260-20264. doi:10.1073/pnas.1116437108
4. Clark M, Hill J, Tilman D. The Diet, Health, and Environment Trilemma. Published online 2018:29.
5. Aerts R, Honnay O, Van Nieuwenhuyse A. Biodiversity and human health: mechanisms and evidence of the positive health effects of diversity in nature and green spaces. British Medical Bulletin. 2018;127(1):5-22. doi:10.1093/bmb/ldy021
6. Toledo Á, Burlingame B. Biodiversity and nutrition: A common path toward global food security and sustainable development. Journal of Food Composition and Analysis. 2006;19(6-7):477-483. doi:10.1016/j.jfca.2006.05.001
7. Allen S, Brauw A de. Nutrition sensitive value chains: theory, progress, and open questions. Global Food Security. 2018;16(International Food Policy Research Institute (IFPRI), 2033 K Street NW, Washington, DC 20006, USA.):22-28. doi:10.1016/j.gfs.2017.07.002

8. Ye S. Minnesota Agricultural Profile. Published online 2019. https://www.mda.state.mn.us/sites/default/files/inline-files/mnagprofile2019.pdf
9. Muckey, Erik. (2018). Small Grains in Minnesota: Assessing the Feasibility of Local Supply Chains. Retrieved from the University of Minnesota Digital Conservancy, https://hdl.handle.net/11299/200086.
10. Tosh SM, Bordenave N. Emerging science on benefits of whole grain oat and barley and their soluble dietary fibers for heart health, glycemic response, and gut microbiota. Nutr Rev. 2020 Aug 1;78(Suppl 1):13-20. doi: 10.1093/nutrit/nuz085.
11. Zhong, B., Wiersma, J., Steffenson, B., Smith, K.,2019. Winter Barley: An Emerging Crop https://extension.umn.edu/small-grains-crop-and-variety-selection/winter-barley-emerging-crop
12. Azzahir, Atum. 2021. March, 3. *Cultural Heritage.*
13. Rodríguez, J. *Introduction to Qualitative Research & Coding.*
14. Tudge, J. Rosa, E.M. (2021). Bronfenbrenner's Ecological Theory. In The Encyclopedia of Child and Adolescent Development (eds S. Hupp and J. Jewell). https://doi.org/10.1002/9781119171492.wecad251
15. Nosek, B A., Alter, G., Banks, G C., Borsboom, D., Bowman, S D., Breckler, S J., Buck, S., Chambers, C D., Chin, G., Christensen, G., Contestabile, M., Dafoe, A., Eich, E., Freese, J., Glennerster, R., Goroff, D., Green, D P., Hesse, B., Humphreys, M., Ishiyama, J., Karlan, D., Kraut, A., Lupia, A., Mabry, P., Madon, T., Malhotra, N., Mayo-Wilson, E., McNutt, M., Miguel, E., Paluck, E Levy., Simonsohn, U., Soderberg, C., Spellman, B A., Turitto, J., VandenBos, G., Vazire, S., Wagenmakers, E J., Wilson, R., Yarkoni, T. (2015). Promoting an open research culture. *SCIENCE, 348(6242).* 1422-1425.

16. Burton, R.J.F., Forney, J., Stock, P., & Sutherland, L.-A. (2020). The Good Farmer: Culture and Identity in Food and Agriculture (1st ed.). Routledge. https://doi.org/10.4324/9781315190655
17. Woods RH. More Alike than Different: The Culture of the Restaurant Industry. *Cornell Hotel and Restaurant Administration Quarterly*. 1989;30(2):82-97. doi:10.1177/001088048903000219